REMARKS

Claims 78-121 have been added in this second preliminary amendment. These claims are patentable over the references cited in Application 996. Specifically, Claims 78, 102, and 114-121 recite in part:

> performing a detailed placement process that assigns a final location to each of the cells by optimizing a cost function dependent on the sites in pairs of rows, thereby allowing swapping of cells between the pairs of rows based on the cost function.

Claim 90 recites in part:

> performing a detailed placement process that assigns a final location to each of the cells by optimizing a cost function dependent on the sites in pairs of rows, …; and
>
> using a dynamic programming technique to perform a swapping of cells between the pairs of rows based on the cost function.

Applicants respectfully submit that the cited references fail to disclose or suggest these limitations.

For example, U.S. Patent No. 5,818,729 (Wang) places cells within an integrated circuit design using a spanning tree model and quadratic optimization. Col. 2, lines 55-58. In particular, Wang teaches a conjugate-gradient quadratic formula based placement system (e.g. GORDIAN), which inputs a design in a netlist form and generates a connectivity matrix for each multi-pin net within the design. Col. 2, lines 58-62. The GORDIAN placement system performs global optimization using a conjugate gradient process to minimize wire lengths of circuit elements in nets. Col. 2, lines 62-64. Wang teaches that GORDIAN advantageously considers all partitions or regions in a design simulataneously (e.g. it is global). Therefore, Wang

fails to teach optimizing a cost function dependent on the sites in pairs of rows, as recited in Claims 78, 90, 102, and 114-121.

Koide fails to remedy the deficiencies of Wang. Specifically, Koide teaches a placement method including three phases. Page 405, Abstract. In the first phase, a timing driven mincut placement algorithm is used to minimize total wire length, distribute cells uniformly in the placement region, and reduce violations of timing constraints. Page 406. This algorithm is based on ordinary hierarchical quadratic partitioning. Page 407. In the second phase, any remaining timing constraint violations are eliminated by transforming the placement problem into a mathematical (i.e. non-linear) programming problem. Page 408. Koide applies mathematical programming to sub-circuits to minimize computation time and memory space. Page 408. In the third phase, cells are assigned to cell rows. Page 410. In one embodiment, Koide groups cells between each two consecutive rows (e.g. see Fig. 6(a)) and then assigns a cell to a specific row (called row assignment of y-direction) based on wire length and timing constraints. At this point, the final placement of the cell in the row (called row assignment of x-direction) is determined, also based on wire length and timing constraints. Page 410.

Thus, Koide locks a cell into a particular row before its final placement. In contrast, Applicants' placement method includes, "performing a detailed placement process that assigns a **final** location to each of the cells by optimizing a cost function dependent on the **sites** in **pairs of rows.**" (recited in Claims 78, 90, 102, and 114-121, emphasis added) This flexibility ensures that congestion driven placements characterized by non-uniform densities can be resolved very quickly and efficiently. Specification, page 8, lines 15-17.

MAY 0 2 2003

TECHNOLOGY CENTER 2800

Kahng also fails to remedy the deficiencies of Wang. Specifically, Kahng teaches a method of single-row cell placement. Page 241, Abstract. Kahng explicitly teaches that cell order is fixed within a particular row. Page 241, Abstract. Therefore, Kahng also fails to teach optimizing a cost function dependent on the sites in pairs of rows, as recited in Claims 78, 90, 102, and 114-121.

Based on the above remarks, Applicants respectfully submit that new Claims 78-121 are patentable over the cited art in Application 996.

If there are any questions, please telephone the undersigned at 408-451-5907 to expedite prosecution of this case.

Respectfully submitted,

Customer No.: 35273

Jeanette S. Harms
Attorney for Applicant
Reg. No. 35,537

I hereby certify that this correspondence is being deposited with the United States Postal Service as FIRST CLASS MAIL in an envelope addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450, on May 1, 2003.

5/1/03
Date

Rebecca A Burrow
Signature